

Rebuttal to Patrick Jones Regarding Rifle Range Safety
By Edward B. Wilkes October 30, 2024

This paper rebuts the arguments made by Patrick Jones in paragraph 45 of the “Verified Answer” his attorney (Shon Northam) filed with the Court in response to the lawsuit filed by the Anderson/Millville Residents. See Addendum 2 of this paper for background regarding this lawsuit.

Petitioner: Anderson/Millville Residents

Respondents: Shasta County, Shasta County Board of Supervisors, and Patrick Jones (Real Party in Interest) (hereinafter RPI Jones)

Administrative Record (AR): A 6,571-page document constituting the entire evidence being reviewed by the Court. When referenced, it is written as “ARXXXXX”, the “XXXXX” being the 5-digit page number of the document, from 00001 to 06571.

Executive Summary.

- RPI Jones states the [planned] backstops are the highest in California, but the Redding Gun Club backstop is over five times higher.
- RPI Jones states that his backstop berms greatly exceed even the ‘Best Practices’ advanced by the NRA, but the NRA does not advance any Best Practices.
- RPI Jones states that no rifle used on the range will reach California Highway 44, but there are at least ten of the most common and popular rifle/ammunition combinations that will reach Highway 44, imperiling the lives of not only those in the 5,500 vehicles per day on the highway, but also the dozens of homes and businesses within range.
- RPI Jones states that “Highway 44 is approximately 3.5 miles from the [rifle] range”, but the distance is actually 5233 yards, or 2.97 miles.
- To build one backstop for one of the rifle ranges that comply with the Best Practices recommended by RPI Jones would require 1,022,210 dump truck loads of dirt and take 58 years to complete.

1. Adequacy of Backstop Berms. The Verified Answer states: “Rather, as indicated in the AR, the berms being constructed would be the highest backstops in California and greatly exceed even the ‘Best Practices’ advanced by the NRA.”

a. The proposed rifle range backstop berms are 20 feet high.¹ These are not the highest backstops in California. The Redding Gun Club rifle range backstop is 110 feet high.²

b. The statement that the backstop berms “greatly exceed even the ‘Best Practices’ advanced by the NRA” is false and misleading:

- 1) Although the NRA states “the backstop height is site specific and can be up to 20’ high,”³ the NRA specifically prohibits using their Range Source Book as a design standard for gun ranges:

“NEITHER THE READER OF THIS SOURCE BOOK OR ANYONE ELSE IS TO RELY ON ANY REPRESENTATION, DRAWING OR STATEMENT MADE IN THIS SOURCE

¹ Site Plan-Exhibit A2, see “H/C-2 Typ” for 600-yard rifle range on page C-1 and corresponding “H/C-2 Typical Backstop Construction” on page C-2. AR00788-AR00789

² AR003465-AR03467

³ *The Range Source Book*. National Rifle Association Range Services. 11250 Waples Mill Road, Fairfax, VA 22030. 2023; Drawing A4, Section V: Drawings.

BOOK; RELY ON THIS SOURCE BOOK TO DESIGN, BUILD, CONSTRUCT OR OPERATE A RANGE; OR RELY ON ANY CLAIM THAT A PARTICULAR RANGE IS IN COMPLIANCE WITH OR DESIGNED, BUILD, CONSTRUCTED OR OPERATED ACCORDING OR PURSUANT TO THIS SOURCE BOOK...⁴[uppercase and bold print as shown in *The Range Source Book*]

Furthermore: “The purpose of this source book is not, under any circumstances, to act as a substitute for a thorough professional evaluation of any particular shooting range. Such an evaluation of a shooting range should take into account all considerations and circumstances specific to that shooting range.”⁵

- 2) The *NRA Range Source Book* never uses the terms “Best Practices” when discussing design of rifle ranges.⁶ The Shasta County Resource Management Department mistakenly attributes the term “Best Practices” to the NRA as follows: “The project was designed to utilize best practices for outdoor shooting ranges which can be found in the *NRA Range Source Book* (2004) as well as other shooting range best practices guidebooks.”⁷ In addition to this error, the Resource Management Department references a source that is 19 years out of date, and should have been destroyed.⁸
 - 3) RPI Jones uses the term “Best Practices” without describing the source of these “Best Practices”: “The design of the range, we will be using best practices. For Example, the berms where we’ll be shooting into will be 20 feet tall and will be sand-faced.”⁹
 - c. Mistakes happen, and shooters flinch (especially young shooters when shooting a rifle with much more recoil than a .22). Assuming the first shot on a 300-yard range hits the center of the target 4 feet above the bottom of the backstop, it is easily seen that by inadvertently raising the muzzle of an 18-inch rifle barrel only 5/16 inch, the next round will clear the top of the backstop. Likewise, by raising the barrel 5/32 inch will cause the bullet to go over the top of the backstop when firing on the 600-yard rifle range.
2. The Verified Answer states: “Additionally, the ballistics calculations cited by the residents are supremely flawed. Highway 44 is approximately 3.5 miles from the range...only a .50 BMG round has the capability to travel 3.5 miles.” Both of these statements by RPI Jones are incorrect. California State Highway 44 is within range of some of the most common and popular large-bore hunting rifles and ammunition in North America.
 - a. The closest point from the 300-, 500, and 600-yard rifle range firing lines to California State Highway 44 is 5,233 yards, or 2.97 miles.¹⁰

⁴ Ibid, page 6

⁵ Ibid, page 5

⁶ *The Range Source Book*. National Rifle Association Range Services. 11250 Waples Mill Road, Fairfax, VA 22030. 2023. Word search for the term “best practice” conducted using electronic copy of *NRA Range Source Book*, 2023 (Flash Drive purchased from NRA website).

⁷ Shasta County Staff Report, October 24, 2023, AR00767

⁸ *The Range Source Book*. National Rifle Association Range Services. 11250 Waples Mill Road, Fairfax, VA 22030. 2023, page 7: “This source book supersedes the previous Range Manual publications produced by the National Rifle Association. Destroy previous publications.” As of May 20, 2024, the 2023 edition of the Range Source Book is the current edition.

⁹ Jones dialog during his video presentation, Board of Supervisor’s Meeting October 24, 2023, Transcript: AR01284

¹⁰ Distance as measured from USGS topographic maps, AR02968

- b. The .300 Winchester Magnum has a range of between 6,994 yards (3.97 miles) and 6,577 yards (3.74 miles), depending on ammunition.¹¹
 - c. The 450 Marlin has a maximum range of 7,000 yards, or 3.98 miles.¹²
 - d. Additionally, the following commercial rifle ammunition is listed in the *NRA Firearms Sourcebook* with maximum range shown:¹³
 - .338 Lapua Magnum, 250 grain: 7,000 yards (3.98 miles)
 - 7 mm Remington Magnum, 165 grain: 6,951 yards (3.95 miles)
 - .30-06 200 grain bullet has a maximum range of 6,190 yards (3.52 miles)
 - .300 Remington SAUM (Short Action Ultra Magnum), 190 grain: 5,800 yards (3.3 miles)
 - .300 Weatherby Magnum, 180 grain: 5,800 yards (3.3 miles)
 - .300 WSM (Winchester Short Magnum), 180 grain: 5,700 yards (3.24 miles)
 - .257 Weatherby Magnum, 115 grain: 5,400 yards (3.07 miles)
 - .270 WSM (Winchester Short Magnum), 130 grain: 5,300 yards (3.01 miles)
3. Homes and businesses are within range of errant rifle shotfall.
 - a. As noted in the Administrative Record, *Safety Concerns Regarding Zone Amendment 13-007 and Proposed Outdoor Shooting Complex*: “As can be seen from Figure 1, the 7,000 yard maximum range of several ammunition types will impact dozens of homes, a veterinary clinic, and 5.55 miles of California Highway 44 (with an Average Annual Daily Traffic (AADT) of 5,500 vehicles).”¹⁴
4. **Best Practices when designing a rifle range.** If the NRA does not allow anyone to rely on their *Range Source Book* to design a rifle range, then what are the “Best Practices” for designing a range, and where are they found?
 - a. As noted in the Administrative Record, the NRA Staff state: “A bullet from an errant shot or a miss may fly several miles before it impacts the earth. A knowledge of maximum range (as well as what lies beyond the target area) can help a shooter assess whether it is or is not safe to fire.”¹⁵ This seems like a reasonable, common sense best practice.
 - b. AR06284 is the *Environmental Aspects of Construction and Management of Outdoor Shooting Ranges*, by the National Shooting Sports Foundation, and states: “sites for outdoor shooting ranges should be chosen that are safe for the environment, the surrounding community, and range patrons.”¹⁶ These are nice generalizations, but light on the specifics.
 - c. RPI Jones states Best Practices can be found in the Administrative Record: “(see Best Practice in the AR pgs. 5801-6264.)”¹⁷ So what are these Best Practices that the RPI Jones points out?

¹¹ AR02965. (Magnum 220 grain Sierra Match King has a maximum range of 6,994 yards; 190 grain Sierra Match King has a maximum range of 6,577 yards. As noted in the AR, this is not an all-inclusive list.

¹² Ibid. “Gun Safety: Ammunition Maximum Range”, by NRA Staff, posted on November 7, 2019. AR02964.

¹³ *NRA Firearms Sourcebook. Your Ultimate Guide to Guns, Ballistics and Shooting.* Michael E. Bussard and Stanton L. Wormley, Jr. 2006. National Rifle Association of America, 11250 Waples Mill Road, Fairfax, VA 22030-9400.2006. Pages 27-28.

¹⁴ AR02964-AR02969. DOT.CA.GOV, 2017 Traffic Volumes: Route 44 at Millville Plains Road

¹⁵ AR02964. “Gun Safety: Ammunition Maximum Range”, by NRA Staff, posted on November 7, 2019.

¹⁶ AR06333. *Environmental Aspects of Construction and Management of Outdoor Shooting Ranges.* National Shooting Sports Foundation, The Firearm Industry Trade Association; 11 Mile High Road, Newton, CT 06470. 1997.

¹⁷ Case No. 23CV-0203713, Patrick Jones, Real Party in Interest, Verified Answer filed August 22, 2024, paragraph 45

- 1) AR06008-6132 is the *Environmental Management at Operating Outdoor Small Arms Firing Ranges* published by the Interstate Technology Regulatory Council (ITRC)¹⁸. The following excerpts are germane:

“The goal of the safety plan is to keep projectiles within a defined area.” (AR06003)

“Bullet containment is extremely important not only for shooter/public safety reasons, but also metal recovery and containment to mitigate impacts to the environment. ... The selected containment system should be designed to meet site-specific training/shooting requirements, as well as available space for surface danger zone (SDZ), and address all of the environmental concerns. ... **Bullets should be contained in the defined area of the range.** ...

“**An open range**, with an earth berm and no overhead baffles, is the least expensive to build of all of the containment scenarios but has the largest SDZ and **is the range layout most likely to have rounds leave the range proper.** ... “An engineering firm or other subject matter experts with range experience can provide assistance with new range construction or existing range upgrading, including calculation of the SDZ for the containment system selected.” (AR06049-AR06051)
- 2) AR06153-6268 is the DOE Range Design Criteria, referenced by the RPI Jones as a source of “Best Practices”.¹⁹ Two of these best practices, if followed, would either not allow the construction of the planned shooting complex due to safety concerns since homes and California State Highway 44 are in the Surface Danger Zone [para. i) below], or be impossible to construct due to the volume of dirt required to build the backstop berms [para. ii) below].
 - i) “Surface Danger Zones. SDZs should be established to contain all projectiles and debris caused by firing ammunition... The primary danger area established for the impact of all rounds extends 5° to either side of the left and right limits of fire and downrange to the maximum range of any ammunition to be used on the range.”²⁰ (AR06173) Paragraph 2 above lists some of the most common and popular large-bore hunting rifles and ammunition in North America, any or all of which could be used on the proposed rifle ranges if constructed, thereby placing dozens of homes and over 5 miles of California State Highway 44 within the Surface Danger Zone.
 - ii) “Natural terrain such as a mountain or a hill provides an excellent backstop for firing. The terrain should be high enough to capture rounds fired at up to a maximum 15° muzzle elevation.”²¹ (AR06175) Instead of a mountain or hill, the natural terrain in the vicinity of the planned shooting complex is essentially flat. AR02137, page 181, shows the site topography as surveyed by Butler Engineering. The firing line is at an elevation of 580 feet; the north edge of the site elevation is 589 feet for the 300-, 500- and 600-yard rifle ranges. To achieve a backstop tall enough to capture rounds fired at 15° muzzle elevation would require the following backstops, shown in Table 1 (see Addendum 1 for assumptions and calculations):

¹⁸ AR06008, pages 7-44. *Environmental Management at Operating Outdoor Small Arms Firing Ranges: Technical Guidance*. Interstate Technology Regulatory Council (ITRC). 50 F Street NW, Suite 350, Washington, DC 20001. February 2005; (AR06008-AR06051)

¹⁹ *Range Design Criteria*. United States Department of Energy. June 2012 (AR06153-6268)

²⁰ Ibid. (AR06173)

²¹ Ibid. (AR06175)

Table 1. Best Practices Backstop Height Required for Rifle Ranges to Capture Rounds at 15° Elevation

Rifle Range	Required height of backstop	Required cubic yards of dirt	Number of dump truck loads of dirt	Time to build (years)*
300-yard	238 feet	1,535,711	153,571	8.8
500-yard	390 feet	6,117,944	611,794	34.9
600-yard	467 feet	10,222,100	1,022,210	58.3

*Time to build is based on 1 dump truck load every 15 minutes, for 12hours/day (48 truckloads per day), 7 days/week, with no holidays (one year = 365.25 days)

It is obvious that the construction of backstops to meet the Best Practices espoused by RPI Jones is impossible.

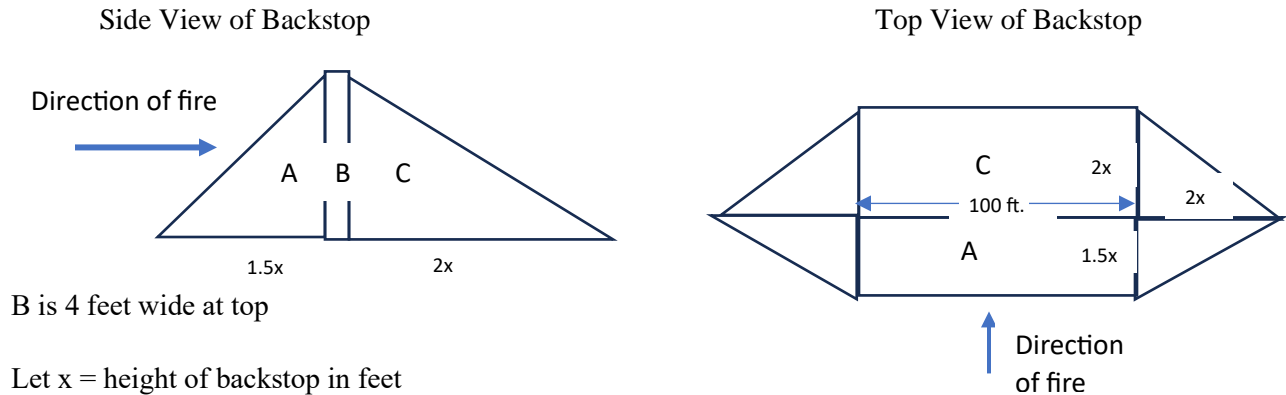
Clearly, this is why as a Best Practice, rifle ranges are sited with either:

- the rifle firing positions located far enough away from homes, businesses, and traffic so that the maximum range of any ammunition to be used on the shooting complex would not reach any homes, businesses, or traffic (e.g., a desert as a background), or
- a mountain as a backstop.

Addendum 1: Rifle Range Backstop Calculations

Given: Worst case (largest bullet drop) ballistics data from manufacturers for ammunition/rifles shown in paragraph 2: bullet drop for 300-yard range = 30 inches (round to 3 feet) and for 500 yard range = 140 inches (round to 12 feet). Assume 600 yard range bullet drop of 15 feet.

- Find:**
- 1) height of backstop for each range to capture round shot at 15° elevation (AR01675)
 - 2) required cubic yards of dirt to achieve backstop, using same design as proposed by Butler Engineering for 20-foot high backstops (AR00120).
 - 3) Number of dump truck loads of dirt to construct backstop, assuming each truck = 10 cubic yards
 - 4) Time to build each backstop, assuming 1 dump truck load of dirt every 15 minutes, 12 hours/day (48 truckloads per day), 7 days/week, no holidays.



B is 4 feet wide at top

Let x = height of backstop in feet

For 300 yard rifle range: $x = (\tan 15^\circ)(900') = 241'$ – bullet drop of 3 feet = 238 feet

For 500-yard rifle range $x = (\tan 15^\circ)(1500') = 402'$ – bullet drop of 12 feet = 390 feet

For 600-yard rifle range $x = (\tan 15^\circ)(1800') = 482'$ – bullet drop of 15 feet = 467 feet

Looking at the Side View diagram above: Area of cross section of backstop:

$$[(0.5)(1.5x)(x)] + 4'x + [(0.5)(2x)(x)] = 0.75x^2 + 4'x + x^2 = 1.75x^2 + 4'x$$

$$\text{Volume of backstop ABC (not including end ramps)} = (100')(1.75x^2 + 4'x)$$

Because of the height of the backstop, the left and right ends of the backstop must also be tapered.

Making the simplifying assumption that the 4' top is inconsequential, then the ends of the backstops can each be considered as $\frac{1}{2}$ of a regular pyramid. Regular pyramid volume = $[\frac{1}{3}] \{\text{area of base}\} [\text{height}]$.

Then one regular pyramid volume = $[\frac{1}{3}] \{[2][(0.5)(1.5x)(2x) + (0.5)(2x)(2x)]\} [x] = [\frac{1}{3}] \{7x^2\} [x] = (\frac{7}{3})x^3$

Then volume of backstop in cubic feet = $[(100')(1.75x^2 + 4'x)] + [(\frac{7}{3})x^3]$

And the volume in cubic yards is of course $(\text{vol in ft}^3)/27$.

Substituting the height for each backstop in feet for x

Rifle Range	Required height of backstop	Required cubic yards of dirt	Number of dump truck loads of dirt	Time to build (years)
300-yard	238 feet	1,535,711	153,571	8.8
500-yard	390 feet	6,117,944	611,794	34.9
600-yard	467 feet	10,222,100	1,022,210	58.3

Addendum 2: Background Regarding the Lawsuit

Patrick Jones' Attorney, Shon Northam, filed a "Verified Answer" in Shasta County Superior Court on August 22, 2024. This filing was in answer to the Anderson/Millville Residents (Petitioner) lawsuit (Case No. 23CV-0203713) filed November 21, 2023. The lawsuit ("Verified Petition for Writ of Mandate") states:

By this action, Petitioner ANDERSON/MILLVILLE RESIDENTS challenges Respondents COUNTY OF SHASTA and SHASTA COUNTY BOARD OF SUPERVISORS' October 24, 2023 approval of the Mitigated Negative Declaration ("MND") for the Zone Amendment 13-007 Project - High Plains Shooting Sports Center - ("Project"); the required findings under the California Environmental Quality Act ("CEQA"), Public Resources Code, section 21000 *et seq.*; and the approval of the Project.²²

Patrick Jones' Verified Answer states:

"RPI [Real Party in Interest] Jones requests the Court deny the Petition for Writ of Mandate and include findings that the actions of Shasta County and Shasta County Board of Supervisors (hereinafter "Board") were valid in approving the Project;"

And in paragraph 45:

PUBLIC SAFETY

"Petitioner's claims in paragraph 66 of the WM [Writ of Mandate] must also fail. RPI JONES agrees that bullets fired up into the sky would, upon falling back to earth, "have sufficient velocity to penetrate the human skull when it falls to earth." However, RPI JONES disagrees with Petitioner's angle of fire. Rather, as indicated in the AR [Administrative Record], the berms being constructed would be the highest backstops in California and greatly exceed even the "Best Practices" advanced by the NRA [National Rifle Association]. Additionally, the ballistics calculations cited by the residents are supremely flawed. Highway 44 is approximately 3.5 miles from the range and by comparison, the Record Range to Highway 299 is approximately 0.8 miles with no issues over a fifty (50) year period. As any gun aficionado or even well-research person would know, only a .50 BMG round has the capability to travel 3.5 miles. To be clear, the Project will not allow that caliber at the Range. The AR also reflects images of RPI JONES shooting a .50 BMG at the Redding Gun Range with no issues. (see Best Practice in the AR pgs. 5801-6264.)"²³

²² Case No. 23CV-0203713, Filed November 21, 2023 in the Superior Court of the State of California for the County of Shasta

²³ Case No. 23CV-0203713, Patrick Jones, Real Party in Interest, Verified Answer; filed August 22, 2024.